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CONTROLLING AMBIENT ATMOSPHERE DURING INVESTIGATION OF SAMPLE  
THEREWITHIN USING ELECTROMAGNETIC RADIATION

TECHNICAL FIELD

The disclosed invention relates to investigation of samples using electromagnetic radiation, and more specifically to the use of ellipsometer and the like systems to monitor the effects of controlled atmospheric ambients thereupon.

BACKGROUND

It is known to investigate samples with electromagnetic radiation. It is further known to place samples in chambers in which the atmospheric ambient is controlled during said investigation. For instance, where Ultraviolet range wavelengths are utilized it is typical to evacuate a chamber in which is present a sample, or to purge it with, for instance, nitrogen or argon, in order to avoid the UV absorbing effects of oxygen and water vapor and the like.

While the present disclosure includes use of such as chamber evacuation and purging with nitrogen and/or argon etc. where other bases exist to establish Patentability, (such as electromagnetic radiation developing and monitoring systems), the primary foci of this Disclosure are to disclose:

that effective ambient controlling Chambers can be of single or multiple region construction; and

that while the ambient in a chamber region can be vacuum or comprise nitrogen and/or argon, said ambient can also be caused to comprise a component with which said sample will potentially react. Where the later is the case, sample reaction can be monitored by changes in electromagnetic radiation caused to interact with said sample.

It is noted that Pending Patent Application Serial No. 10/199,536 discloses application of a standard shape objects, (eg. spheres and cylinders etc), in a material deposition chamber, which standard shape objects can be monitored by electromagnetic radiation during, for instance, coating depositions thereonto during similar deposition onto nearby odd shaped objects. The present invention extends the concept of, (while performing investigation of an object with electromagnetic radiation), controlling an ambient inside a Chamber so as to achieve deposition of material onto the surface of said object, to the controlling an ambient in a chamber in which is a sample to, for instance, effect and monitor change, (eg. degradation), of said sample as a result of the presence of said ambient.

One specific use of a Multiple Chamber System is to provide a Sample containing Chamber in which reactive gas can be caused to be present, which reactive gas would best not be allowed contact with ellipsometer system components. Particularly where UV wavelengths are utilized, the ellipsometer component containing Chambers can be separately evacuated or purged with such as nitrogen and/or nitrogen.

#### DETAILED DESCRIPTION

Fig. 1 demonstrates an effective Multiple Region Chamber (1). The Multiple Region Chamber (C) comprises a Sample System containing Region, to which is mounted a Source (PSG) and Detector (PSD) of electromagnetic radiation. Note that Windows (AC1) and (AC2) separate the Sample System containing Region from the Source (PSG) and Detector (PSD) Regions. The atmosphere in the region of the Sample System (SS) and that in either of the Source (PSG) and Detector (PSD), it should be appreciated, can be controlled to be the same or different. That is, the Source (PSG) and Detector (PSD) and the Sample System (SS) containing Chamber can be considered to comprise separate Chambers, or separate regions of a Chamber in which the atmospheric ambient therewithin can be separately controlled. Fig. 1 also indicates "Ambient Control Mean" on each of the the Source (PSG) and Detector (PSD) and the Sample System (SS) containing Chambers. Said means are to be considered to be functionally capable of evacuating and/or entering and/or or purging gas.

Fig. 2 shows an Ellipsometer System contained completely inside a Single Chamber (C). Shown are a Source of Electromagnetic Radiation (LS), a Polarizer (P), a Compensator (C) a Stage for supporting a Material System (MS), Reflection Path Compensator (C'), Analyzer (A) and Detector (DET), and Transmission Path Compensator (C''), Analyzer (A) and Detector (DET). In practice all said Elements except the Source (LS) and a Detector (DET), (and a Material System (MS) to investigate), can be present or not to effect various types of Reflectometer, Spectrophotometer, Ellipsometer, (eg. Rotating Analyzer, Rotating Polarizer, Rotating Compensator etc.) Systems.

#### PRELIMINARY CLAIMS

1. A system for investigation samples utilizing electromagnetic radiation comprising multiple chambers, each of said chambers comprising means for controlling the ambient atmosphere therewithin to be the same or different than is present in the other chambers, said system further comprising means for providing a beam of electromagnetic radiation and causing it to interact with a sample system then be detected.
2. A method of investigating the effect of atmospheric components on a sample comprising the steps of: